The Facts About Phosphorus

An essential **element**

Phosphorus is an important nutrient for both plant and animal growth. In human and animal bones, Phosphorus is present in large quantities. It is also found in smaller quantities throughout the body and is critical for various cellular functions including as a component of DNA. Humans and animals obtain Phosphorus through their diet. Consequently, it is common practice for animal feeds to be fortified with Phosphorous compounds to ensure adequate nutrition.

For plants, Phosphorus is equally important in a whole range of processes including photosynthesis. Phosphorus is, together with Nitrogen, very important as a fertiliser for crop plants. All crops receive Phosphorus in the form of phosphate in mineral fertilisers or manure during the growing season.

Phosphorous compounds also have a wide range of industrial uses such as detergents, lighting and explosives.

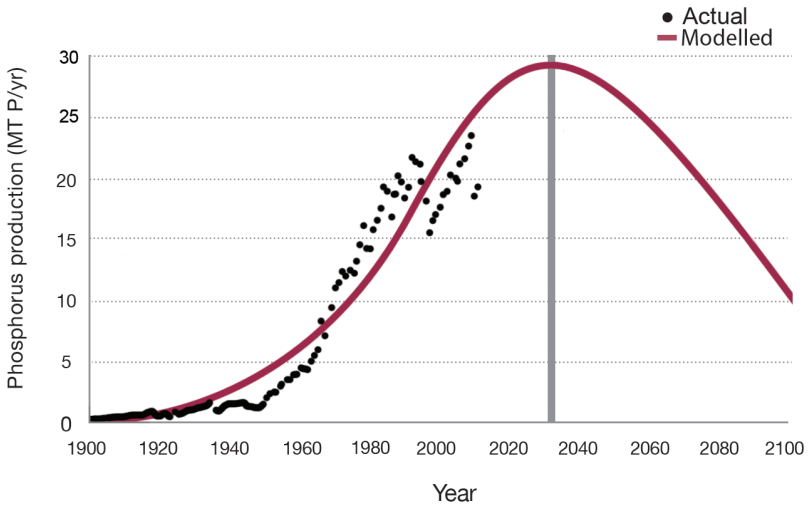
Sources of **Phosphorus**

Soils naturally contain Phosphorus in several compounds; the level and composition varies with geological conditions. Farmers use manure, guano, sewage sludge and fertilisers derived from rock phosphate to increase Phosphorus levels and improve productivity.

Rock phosphate is the mineral form of Phosphorus, it is mined and processed into fertilisers and feed ingredients as well as being used in a wide range of other industrial applications. Rock phosphate tends to contain high quantities of heavy metals and sometimes contains radioactive elements. As a result, it requires extensive refinement to be suitable for use as a fertiliser or feed ingredient.

It is also a finite resource; large rock phosphate deposits are found in a small number of locations so long-term security and cost of supply is a concern. It is thought that rock phosphate mining will peak in the middle of the century and then decline due to a lack of supply – see the graph below.

Peak Phosphorus curve



Source: Jasinski, 2006; European Fertilizer Manufacturers Association, 2000

Closing **the loop**

Once Phosphorus enters watercourses as sewage or run-off from agricultural land, it is lost for human use. It flows out to sea where it is deposited in sediments that will eventually become rock phosphate and return to the surface through geological processes occurring over millions of years. Therefore, recovering and recycling Phosphorus is vital for the long-term security of agricultural production.

Most farmers already treat slurries and manure from livestock farming as a precious resource for nutrients, including Phosphorus. EFPRA's members ensure that valuable materials are recovered once the animal leaves the farm gate. In this way, Phosphorus from food grade sources is reused as a high value feed ingredient or fertiliser.

Recovering for animal feed

Following slaughter, food grade bones are normally processed to produce gelatine – an important ingredient for the food and pharmaceutical industry. Phosphorus is obtained in the form of dicalcium phosphate di-hydrate as a co-product of gelatine manufacturing.

Crushed bones are degreased then demineralised with diluted hydrochloric acid before the calcium-phosphate is precipitated. The end product is a compound rich in Phosphorus and Calcium that is suitable for use in feed stuffs for pets, poultry, pigs and aquafeed.

The main benefits of Phosphorus recovered in this way are:

- high level of available and digestible Phosphorus – approximately 95%
- Calcium available in digestible form
- safe product which is fully traceable from origin
- low levels of contaminants
- contributes to sustainable livestock production

A better option than rock phosphate

The composition of recovered calcium phosphate is superior and safer to that of rock phosphate:

Contaminant	Units	Maximum permitted in feed[1]	Recovered di-calcium phosphate[2]	Processed rock phosphate[3]
Arsenic	mg/kg	10	< 1	5
Cadmium	mg/kg	10	< 0.5	5
Fluorine	mg/kg	2,000	400	1,200
Lead	mg/kg	15	2.3	5
Mercury	mg/kg	0.1	< 0.01	< 0.01

1. Directive 2002/32/EC

2. Information from Gelita, PB Gelatins and Sonac/Rousselot

3. Based on database of contaminants of GMP+, The Netherlands

Suitable for **fertilisers**

Phosphorus is also returned to the food chain as fertiliser. Dicalcium phosphate is an excellent fertiliser ingredient, with lower levels of heavy metals a distinct advantage compared to rock phosphate derived fertilisers. Hydroxyapatite (TCP) or de-limed bone meal is another by-product from food grade bones that is used as fertiliser.

EFPRA represents the animal by-products processing sector in Europe and is a leading authority on the regulation, manufacture, bio-security and nutrient value of processed animal protein and animal fat. EFPRA members employ over 15,000 employees and process raw material on approximately 400 lines across the entire membership.

EFPRA has a single primary objective; to continually improve the safety, security and sustainability of European food production by efficiently processing animal fats and animal by-products.

It brings together European by-product processing organisations that produce high-quality products, edible animal fats, minerals and processed animal protein. It also works closely with partners worldwide for the technical advancement of the industry.

For more information about processed animal protein, animal fats and the European by-product processing industry call +32 (0) 2 203 51 41 or visit www.efpra.eu

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DRIVING FOOD CHAIN SECURITY AND SUSTAINABILITY IN EUROPE

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